

Winch, Particularly for Driving an UmbrellaField of the Invention

The invention concerns a winch, particularly for driving an umbrella pursuant to the preamble of claim 1.

Background of the Invention

There are many types of winches. In the case of a fully unwound rope, this rope can be rewound onto a rope drum in one or the other direction. In specific cases, however, it may be necessary that the rope should be wound onto the rope drum only in one specific direction. A ratchet with pawls, which lock the winding of the rope in one direction is provided in known winches. For the purpose of unwinding the rope in known winches, the pawl is disconnected so that it is initially not active at the time of rewinding and has to be reconnected first. If the operator forgets to reconnect it, the winding of the rope can occur in the opposite direction.

In European Patent application No. 02011893 is proposed a winch in which a click-stop device is combined with a releasable click-stop device, which can be operated by a manual crank of the winch. A prerequisite for a correct functioning is, however, that the click-stop device cannot be released manually, but that the switchover from the click-stop device to the brake device and vice versa is determined by the rotational direction of the manual crank. It is also a prerequisite that the rope be wound onto the rope drum in the correct direction, which however is not automatically guaranteed.

Summary of the Invention

It is the object of the invention to design a winch in such a way that a wrong winding direction of the rope on the rope drum is automatically prevented.

The object is attained pursuant to the invention by means of the characterizing features of claim 1.

By providing the winch with a feeler, which responds to the direction of entry of the rope when the rope is unwound or the rope is wound on the rope drum, and which is connected to a stop that coacts with a stop assigned to the rope drum, which locks the rope drum if winding occurs in the wrong direction, it is automatically ensured that the rope is always wound in the correct direction.

Advantageous embodiments of the winch are defined in claims 2 through 13.

In accordance with claim 2, the feeler can be prestressed in the locking position. In accordance with claim 3 is likewise possible a configuration in which the feeler is prestressed when it is released. In principle, it is possible for the feeler to be active only at certain locations on the rope drum, but even more advantageous is an embodiment pursuant to claim 4, according to which the feeler is fixed and is arranged over the entire length of the rope drum.

Particularly preferred is an embodiment pursuant to claim 5, according to which the feeler is arranged on both sides on an arm of a two-armed rocker, respectively, which can be pivotably arranged around an axis, which is arranged parallel to the axis of the rope drum and at a radial distance thereto. The locking member is then provided on the other arm of the rocker. This winch responds to the direction of entry of the rope. For this purpose, it is useful if the winch is further developed in accordance with claim 6 and the pivot pin of the rocker is designed as a guide rod extending across the rope drum, which conveys the rope with a certain degree of guidance and improves the response of the feeler.

Claim 7 describes an alternative embodiment of the feeler, wherein the latter is configured as a slide that is prestressed in the direction of the surface of the rope

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drum and on which the locking member is arranged. The locking member runs against the stop when the rope drum rotates in the wrong direction. If direction of rotation is correct, the feeler responds to the winding of the rope and lifts the locking member out of the locking range of the stop.

Particular advantages of the winch result especially if the winch is equipped, as described in claim 8, with a releasable click-stop device and a releasable brake device, which can be intercombined and actuated by the manual crank. An especially suitable embodiment of said click-stop device combination is defined in claims 9 through 13.

#### Brief Description of the Drawings

Exemplary embodiments of the invention are described in more detail in the following based on the drawings, wherein:

- Figure 1 shows an umbrella in closed status attached to an extension arm having a known winch as drive;
- Figure 2 shows an enlarged lateral view of the umbrella pole used in Figure 1 with an open umbrella;
- Figure 3 shows an enlarged vertical section view of the umbrella pole of Figure 2;
- Figure 4 shows an exploded view of a diagram of a first winch pursuant to the invention;
- Figure 5 shows a plan view onto the rope drum of the winch of Figure 4 in "released position;"
- Figure 6 shows the winch of Figure 5 in the VI-VI section of Figure 5;
- Figure 7 shows the winch of Figure 5 in the VII-VII section of Figure 5;
- Figure 8 shows the winch from Figure 5 in the "locking position";
- Figure 9 shows the winch of Figure 8 in the IX-IX section of Figure 8;
- Figure 10 shows a diagram of a second winch pursuant to the invention;
- Figure 11 shows a vertical section view of a third winch pursuant to the invention;

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Figure 12 shows the winch of Figure 11 in the "released position" in the XI-XI section of Figure 11; and

Figure 13 shows the winch of Figure 12 in the "locking position".

#### Preferred Embodiments of the Invention

Figures 1 to 3 show an umbrella 2 in the closed status arranged on an extension arm 4, which is attached to a stand 6 in a telescoping fashion. Such an umbrella is known for example from CH-A-367 290 and 666 166. This known umbrella 2 has an umbrella frame containing a crown 8, which is connected to the extension arm 4 via a ball joint 10. On the crown 8 are provided top rods 12, which are supported by a slide 16 via support rods 14. The slide 16 and the crown 8 are connected to each other via an umbrella pole 18.

This umbrella is equipped with a winch as drive pursuant to EP application 02011893.1. The umbrella pole 18 contains a first lower pole section 20, which is connected to the slide 6, wherein it is inserted in an opening of the slide 16 and secured against sliding out by means of a retaining element 21. On the lower end of the pole section is arranged a winch 22, which is actuated by a manual crank 24. The umbrella pole 18 comprises also a second upper pole section 26, which is connected to the crown 8. If the umbrella is closed pursuant to Figure 1, the first pole section 20 and the second pole section 26 are separated from each other and only connected by means of a rope 28 of the winch 22. If the umbrella is open, the pole sections 20 and 26 are connected to each other via a coupling device 30, as is illustrated in Figures 2 and 3. The coupling device 30 is formed by a profiled pin 32 on one of the pole sections 20, which coacts with a bushing 34 of the other pole section 26, wherein the bushing is equipped with a corresponding counterprofile 36 in order to achieve a torsionally rigid connection between the pole sections 20, 26. The rope 28 is guided substantially coaxially with respect to the center line 35 through the hollow pole sections 20, 26 and is attached on the inside of the bushing 34 of the coupling device 30 by means of a seal 37 or a knot.

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The first pole section 20 comprises the winch 22 with the manual crank 24. In addition, the first pole section 20 is equipped with a ring-like handle 38, which extends downward transversely to the axis of the winch 22 and is molded onto the housing 40 of the winch. In this example, the first pole section 20, the housing 40 of the winch 22, and the ring-like handle 38 are configured as one piece and are formed by two molded halves 42a and 42b, which rest against each other in a vertical center plane 44, which is aligned transversely to the axis of the winch 22.

The winch 22 is formed by the manual crank 24, which is mounted on an axle 46 seated in a rope drum 48. The rope drum, in turn, is seated in bearing plates 50a, 50b of the housing 40. The rope drum serves for winding and unwinding the rope 28. The winch 22 is equipped with a click-stop device 52 in order to keep the umbrella frame and consequently the umbrella in the open status. This click-stop device is combined with a brake device 54, which enables a controlled closing of the umbrella.

The click-stop device 52 consists of a ratchet 56, which can freely rotate on the rope drum 48 and on which a pawl 58 engages, which is seated in the housing 40 and is prestressed against the ratchet by means of a spring 60. The axle 46 rests against the ratchet 56 by means of a flange 62 and a brake disk 64. The axle 46, which is arranged coaxially in an opening 66 of the rope drum 48, is connected via a threaded joint to said axle and comprises an outside thread 68, which cooperates with an inside thread 70 of the opening 66 of the rope drum.

The operating principle of the winch 22 with the click-stop device 52 and the brake device 54 is as follows:

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If the manual crank 24 is rotated clockwise to open up the umbrella, the outside thread 68 of the axle 46 is screwed further into the inside thread 70 of the rope drum 48 that is curbed by the tension of the rope 28, causing the flange 62 of the axle 46 to press the brake disk 64 against the ratchet 56 and fixing it on the rope drum 48. In this way, the manual crank 24 is connected to the rope drum 48 and the rope 28 can

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be wound, wherein the pawl 58 on the ratchet 56 prevents the coupled rope drum from reversing. If the umbrella is to be closed, the manual crank 24 is moved counterclockwise, thus screwing the axle 46 out of the rope drum 48 through the outside thread 68 and loosening the flange 62 from the status wherein it is pressed against the brake disk 64 in the direction of a slipping clutch. As soon as the brake pressure of the brake disk 64 is less than the tensile force of the rope 28 on the rope drum 48, the action of the click-stop device 52 is interrupted and the rope 28 begins to run off the rope drum 48. If the manual crank 24 is stopped, the tensile force of the rope leads to a continued turning of the rope drum 48 and thus a tightening of the outside thread 68 and the inside thread 70, thereby increasing the brake pressure on the brake disk 64 until the rope drum 48 comes to a standstill. Only a renewed reversal of the manual crank 24 in counterclockwise direction will restart the unwinding of the rope 28 and consequently the closing of the umbrella. In this way is made possible a controlled closing of the umbrella.

For a rapid closure of the umbrella, the winch 22 is also equipped with a freewheel device 71 containing a freewheel button 72, which is arranged on the side of the housing 40 facing away from the manual crank 24. The freewheel button 72 contains a retaining pin 74, which can be moved against a locking profile 76 of the rope drum 48 in opposition to the force of a prestress spring 78. The freewheel device 71 then contains on the side of the axle 46 facing away from the manual crank 24 also an axle extension 80 comprising a blocking device 81, which carries a stop 82 that coacts with the face 86 of the rope drum 48 via a spring 84. The axle extension 80 has a thread 88, which carries the stop 82 designed as a nut. A circlip 90 comprising a radially inward directed latch engages with a groove 92 in the axle extension 80 of the axle in order to prevent an unintended adjustment of the stop 82.

The operating principle of the freewheel device 71 is as follows:

If the freewheel button 72 is actuated, the retaining pin 74 engages with the locking profile 76 of the rope drum 48 and the rope drum 48 is blocked. In this state, the

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manual crank 24 can be rotated further in counterclockwise direction until the outside thread 68 and the inside thread 70 have been loosened enough so that no frictional connection exists between the brake disk 64 and the ratchet 56. At the same time, the stop 82 presses the spring 84 against the face 86 of the rope drum 48, so that the rope drum 48 and the axle 46 are blocked, and the outside thread 68 and the inside thread 70 can no longer move relative to each other. In this way, the brake disk 64 is prevented from remaining active on the ratchet 56. If now the freewheel button 72 is released, the rope 28 rolls from the rope drum 48 due to the tensile force of the rope 28 and rotates the rope drum 48 and the manual crank attached thereto. The locking of the blocking device 81 is eliminated, and the brake device 54 and the click-stop device 52 are activated again if the manual crank 24 is moved with increased rope tension in clockwise direction, that is, in the opening direction of the umbrella, thus releasing the stop 82 from the face 86 and restarting the clamping action of the brake disk 64.

The winch pursuant to the invention illustrated in Figures 4 to 10 is suited for various applications, but particularly in connection with a winch 22 of the above-described kind; in the following description, the reference numbers utilized above are used for identical components, and with respect to the details reference is made to the above description.

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Figures 4 to 9 show an embodiment of a winch 22a pursuant to the invention having a feeler 100 that responds to the direction of entry of the rope on the rope drum 48a if the rope 28 is fully unwound and is connected to a locking member 102, which coacts with a stop 104 assigned to the rope drum 48a if the rope is wound in the wrong direction and locks the wrong winding direction.

The feeler 100 extends across the entire length of the rope drum 48a and is mounted on an arm 106 of a two-arm rocker 108, which is pivotably arranged on a pivot pin 110. The pivot pin 110 is mounted on bearing plates 50a, 50b, which are fixedly arranged on both sides of the rope drum 48. The second arm 112 of the rocker 108 contains the locking member 102, which coacts with the stop 104 that is mounted on the rope drum 48. A spring 114 is mounted on the pivot pin 110, is supported by the housing 118 with a spring arm 116, and prestresses the feeler 100 in the free position with the other spring arm 120. The pivot pin 110 extending across the rope drum 48a at the same time acts as a guide for the rope 28, as shown in detail in Figures 7 and 9. If the rope is wound in the correct direction ("open" in Figure 4) pursuant to Figure 7, the feeler 100 assumes the released position shown in Figure 7. However, if the winding occurs in the wrong direction ("closed" in Figure 4), the entering rope 28 lifts the feeler 100 into the locking position, in which the locking member 102 coacts with the stop 104, as shown in Figure 9. Any further rotation of the crank 24 is then blocked.

Figure 10 shows another embodiment of the winch 22b pursuant to the invention, in which a feeler 122 is configured as a slide 124, which can be advanced practically radially against the rope drum 48. Springs 126 prestress the slide 124 against the rope drum 48b. The slide 124 is equipped with locking members 128, which coact with stops 130 that are arranged on lateral flanges 132 of the rope drum 48b. The arrangement is such that the locking members 128 are advanced against the stops 130 in a wrong winding direction (counterclockwise), thus preventing further rotation of the rope drum 48b in the wrong direction of rotation. If the rope drum 48b, in contrast, is driven in the correct direction of rotation (clockwise), the locking members



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128 are inactive. The winding of the rope 28 on the rope drum 48b lifts the feeler 122 further off as the winding operation progresses, which distances the locking members 128 increasingly radially away from the stops 130, thus making them inactive, so that the winch can be rotated freely also in the opposite direction in order to unwind the rope 28 until the feeler 122 detects that the rope 28 has been unwound completely from the rope drum 48b.

Figures 11 to 13 show another embodiment of a winch 22c pursuant to the invention, which is equipped with a click-stop device 52a and brake device 54a combination and also has a feeler 110a, which is configured analog to that in Figures 4 to 9. If the rope 28 is unwound completely, the feeler 100a responds to the direction of entry of the rope onto the rope drum 48c and is connected to a locking member 102a, which coacts with a stop 104a assigned to the rope drum 48c if the winding occurs in the wrong direction, which locks the wrong winding direction.

The feeler 100a extends across the entire length of the rope drum 48c and is fixedly mounted on an arm 106a of a two-arm rocker 108a, which is pivotably arranged on a pivot pin 110a. The pivot pin 110a is mounted to housing sides 134, which are fixedly arranged on both sides of the rope drum 48c. The second arm 112a of the rocker 108a contains the locking member 102a, which coacts with the stop 104a that is mounted on the rope drum 48c. Instead of the spring 114 of the example of Figures 4 to 9, the rocker 108a is provided in this example on a first arm 106a with a mass piece 136, which causes the prestressing of the rocker 108a in the released position due to the gravity of the mass piece 136. The pivot pin 110a extending across the rope drum 48c again acts at the same time as a guide for the rope 28, as shown in detail in Figures 12 and 13. If the rope is wound in the "correct" direction pursuant to Figure 12, the feeler 100a assumes the "released position" shown in Figure 12. If winding however occurs in the "wrong" direction, the entering rope 28 swivels the feeler 100a into the "locking position," in which the locking member 102a coacts with the stop 104a, as shown in Figure 13. Any further rotation of the crank 24a is then blocked.

For the purpose of forming the click-stop device 52a and brake device 54a combination, the rope drum 48c contains a shaft end 138 projecting from the housing side 134, wherein said end is equipped with a supporting flange 140 on the housing side. A brake disk 64a rests against the supporting flange 140, followed by a ratchet 56a and a thrust washer 142, which rests against the face 144 of a threaded sleeve 146 that is screwed onto a threaded section 148 of the shaft end 138. The threaded sleeve 146 forms part of the manual crank 24a of the winch 22c. A stop 150, which takes on the form of a disk retained by a nut and is arranged on the free end of the shaft end, prevents undesired unscrewing of the manual crank 24a from the shaft end 138. A pawl 58a, which is prestressed by means of a spring 60a and is fixedly mounted in a housing 152, coacts with the ratchet 56a.

The mode of operation of the winch 22c is as follows:

For the purpose of winding the rope 28, the manual crank 24a is moved clockwise, which causes the manual crank 24a to screw the threaded sleeve 146 onto the threaded section 148 and consequently presses with its face 144 the thrust washer 142 against the ratchet 56a until said face is locked between the brake disk 64a and the thrust washer 142. The ratchet 56a and the engaging pawl 58a prevent the winch from reversing and hence unwinding of the rope 28. In order to unwind the rope 28, the manual crank 24 is rotated counterclockwise, wherein due to the locking effect of the click-stop device 52a the threaded sleeve 146 is screwed out of the threaded section 148 and consequently the pressing force on the thrust washer 142 is reduced, thus decreasing the locking status of the ratchet 56a and allowing the rope drum 48c to rotate likewise counterclockwise due to the tensile force of the rope 28 and releasing the rope 28. However, this effects in turn a screwing in of the threaded sleeve 146 onto the threaded section 148 and leads thereupon to a renewed clamping of the ratchet and braking of the unwinding rope. Through a controlled rotation of the manual crank 24a in counterclockwise direction can thus be achieved likewise a curbed, that is, controlled, unwinding of the rope 28 from the rope drum 48c.

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The winch pursuant to Figures 11 to 13 is preferably suited for umbrellas pursuant to WO97/04682 and WO01/52686.

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Legend

2	Umbrella	58	Pawl
2a	Umbrella	58a	Pawl
4	Extension Arm	60	Spring
6	Stand	60a	Spring
8	Crown	62	Flange
10	Pivot Joint	64	Brake Disk
12	Top Rods	64a	Brake Disk
14	Support Rods	66	Opening
16	Slide	68	Outside Thread
18	Umbrella Pole	70	Inside Thread
20	First Pole Section	71	Freewheel Device
20a	First Pole Section	72	Freewheel Button
21	Retaining element	74	Retaining Pin
22	Winch	76	Locking Profile
22a	Winch	78	Prestress Spring
22b	Winch	80	Axle Extension
22c	Winch	81	Blocking Device
24	Manual crank	82	Stop
24a	Manual crank	84	Spring
26	Second Pole Section	86	Face of 48
28	Rope	88	Thread
30	Coupling Device	90	Circlip
32	Pin	92	Groove
34	Bushing	100	Feeler
35	Center Line of 18	100a	Feeler
36	Counterprofile	102	Locking Member
37	Seal	102a	Locking Member
38	Ring-Like Handle	104	Stop
40	Housing	104a	Stop
42a	Molded Half	106	Arm
42b	Molded Half	106a	Arm
44	Center Plane	108	Rocker
46	Axle	108a	Rocker
48	Rope Drum	110	Pivot Pin
48a	Rope Drum	110a	Pivot Pin
48b	Rope Drum	112	Arm
48c	Rope Drum	112a	Arm
50a	Bearing Plates	114	Spring
50b	Bearing Plates	116	Spring Arm
52	Click-stop device	118	Housing
52a	Click-stop device	120	Spring Arm
54	Brake Device	122	Feeler
54a	Brake Device	124	Slide
56	Ratchet	126	Spring
56a	Ratchet	128	Locking Element

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130 Stop  
132 Flange  
134 Housing Side  
136 Mass Piece  
138 Shaft End  
140 Supporting Flange  
142 Thrust Washer  
146 Threaded Sleeve  
148 Threaded Section  
150 Stop  
152 Housing